CLAIMS

1   A method of calculating and verifying the integrity of data in a data
communication system comprising a base station and one or more remote stations, the
method including;

transmitting one or more select instructions from the base station to said one or more
remote stations, the select instruction or instructions containing a data field which
matches a portion of an identity or other data field in one or more of the remote
stations;

communicating from a selected remote station or stations a truncated reply containing
identity data or other data of the remote station but omitting the portion transmitted by
the base station;

calculating in the base station a check sum or CRC from the data field originally sent
and the truncated reply data received

and comparing the calculated check sum or CRC with the check sum or CRC sent by
the remote station.

2   A method as claimed in claim 1, wherein the base station is a reader or
    interrogator and the remote station or stations are RFID transponders.

3   A method as claimed in claim 1 or claim 2, wherein the remote station
    transmits its check sum or CRC as data either preceding or appended to its
    identity or other data in its truncated reply.

4   A method as claimed in any of claims 1 to 3, wherein in response to a select
    instruction from the base station the remote station clocks data corresponding

to that in the select instruction through a checksum generator, the data in the truncated reply also being clocked through the checksum generator to derive a checksum which is clocked out appended to the truncated reply data.

5   A method as claimed in any of claims 1 to 4, wherein the base station begins calculating the anticipated checksum or CRC of the remote station or stations during a period preceding the receipt of the truncated reply, to derive a partial checksum calculation based on the data field in the select information, the partial checksum calculation being temporarily saved for use when the truncated reply is received.

6   A method as claimed in claim 5, wherein the base station begins calculating the partial checksum during the transmission of the select information.

7   A method as claimed in claim 5 or claim 6, wherein the truncated reply from the remote station is clocked through a checksum generator to continue calculating the checksum, beginning from the saved partial checksum, whereby upon receiving the last bit from the truncated reply, the final checksum calculated in the base station can be compared with that sent by the remote station.

8   A method as claimed in claim 7, wherein having received the truncated reply from a remote station, the base station resets the checksum calculation logic and pre-loads the partially calculated checksum previously saved, ready to receive the truncated reply from another selected remote station.

9   A method as claimed in claim 7, wherein having received the truncated reply from a remote station, the base station recalculates the data in the select information following successful reception and decoding of each truncated reply, for calculating together with the data in the truncated reply to derive the checksum or CRC, and continuing this process until the base station transmits a new select information request to the remote stations.

10 A method as claimed in claim 2, including sending a command from the reader to a tag command decoder for decoding the command, shifting data in the tag memory to a tag shift register in synchronism with incoming mask data from the reader to a comparator, performing a bit by bit comparison between the mask data and the tag memory data at the comparator, and calculating a checksum or CRC at a checksum or CRC generator within the tag.

11 A method as claimed in claim 10, including presenting the input data from the reader and the output from the tag shift register to respective inputs of a logic circuit.

12 A method as claimed in claim 10 or claim 11, including setting within the tag a Compare OK or Select flag, which serves to enable the tag to take part in an arbitration cycle, when the tag data and the mask value match.

13 A method as claimed in any of claims 10 to 12, wherein when the tag is receiving the mask and performing the comparison with the internal memory data, it is also shifting the internal data through the checksum or CRC generator 8, this being the same CRC generator of generators used to generate the tag CRC.

14 A method as claimed in any of claim 12 or claim13, when dependent on claim 12, wherein once the Select flag has been set the tag stops shifting any further data through the transmit shift register and also no further data is shifted through the CRC generator 8, the CRC generator 8 freezing and retaining its current state.

15 A method as claimed in claim 14, wherein a pointer in the tag marks the position where the comparison ended, and the tag participating in the arbitration sequence as determined by the arbitration algorithm implemented, and by command from the reader (sending arbitration commands), switches on its Transmitter, and begins to shift out the tag ID data, starting from bit position following the point where the comparison with the mask ended.

16 A system for calculating and verifying the integrity of data in a data communication system comprising a base station and one or more remote stations, the system comprising;

transmitting means for transmitting select instructions from the base station to said one or more remote stations, the select instruction containing a data field which matches a portion of an identity or other data field in one or more of the remote stations;

transmitting means for transmitting from a selected remote station or stations a truncated reply containing identity data or other data of the remote station but omitting the portion transmitted by the base station;

calculating means for calculating in the base station a check sum or CRC from the data field originally sent and the truncated reply data received

and a comparator for comparing the calculated check sum or CRC with the check sum or CRC sent by the remote station.

17 A system as claimed in claim 16, wherein the base station is a reader or interrogator and the remote station or stations are RFID transponders.

18 A system as claimed in claim 17, wherein each tag comprises a command decoder for decoding the command from the reader, a shift register for shifting data in the tag memory in synchronism with incoming mask data from the reader to a comparator, the comparator performing a bit by bit comparison between the mask data and the tag memory data, and a checksum or CRC generator.

19 A system as claimed in claim 18, wherein the input data from the reader and the output from the shift register are presented to respective inputs a Logic Gate.

20 A system as claimed in claim 18 or claim 19, wherein when the tag data and the mask value match, the tag sets a Compare OK or Select flag which serves to enable the tag to take part in an arbitration cycle.

21 A system as claimed in any of claims 18 to 20, wherein means are provided whereby when the tag is receiving the mask and performing the comparison with the internal memory data, it is also shifting the internal data through the checksum or CRC generator 8, this being the same CRC generator used to generate the tag CRC.

22 A system as claimed in claim 20 or claim 21, wherein once the Select flag has been set the tag stops shifting any further data through the transmit shift register and also no further data is shifted through the CRC generator 8, the CRC generator 8 being controlled to freeze and retain its current state.

23 A system as claimed in claim 22, wherein a pointer in the tag marks the position where the comparison ended, and the tag participates in the arbitration sequence as determined by the arbitration algorithm implemented, and by command from the reader (sending arbitration commands), it switches on its Transmitter, and begins to shift out the tag ID data, starting from bit position following the point where the comparison with the mask ended.

24 A system as claimed in claim 23, wherein at the same time as the tag ID data is shifted out to the modulator, it is also shifted through the CRC generator,. the CRC generator taking up where it previously stopped as if it had not been frozen and without resetting its value.

25 A system as claimed in claim 24, wherein when the last data bit has been shifted out, a switch within the tag switches to the output of the CRC generator which continues transmitting until all the CRC bits have been transmitted.

26 A system as claimed in claim 25, wherein when the last CRC bit has been transmitted a further switch in the tag switches off the transmitter and returns the tag to the standby state.

27 A transponder or tag for use in an RFID system with a reader or interrogator, comprising a command decoder for decoding the command from the reader, a shift register for shifting data in the tag memory in synchronism with incoming mask data from the reader to a comparator, the comparator performing a bit by bit comparison between the mask data and the tag memory data, and a checksum or CRC generator.

28 A transponder or tag as claimed in claim 27, wherein the input data from the reader and the output from the shift register are presented to respective inputs a logic gate.

29 A transponder or tag as claimed in claim 27 or claim 28, wherein when the tag data and the mask value match, the tag sets a Compare OK or Select flag which serves to enable the tag to take part in an arbitration cycle.

30 A transponder or tag as claimed in any of claims 27 to 29, wherein means are provided whereby when the tag is receiving the mask and performing the comparison with the internal memory data, it is also shifting the internal data through the checksum or CRC generator , this being the same CRC generator used to generate the tag CRC.

31 A transponder or tag as claimed in claim 29 or claim 30, wherein once the Select flag has been set the tag stops shifting any further data through the transmit shift register and also no further data is shifted through the CRC generator , the CRC generator being controlled to freeze and retain its current state.

32 A transponder or tag as claimed in claim 31, wherein a pointer in the tag marks the position where the comparison ended, and the tag participates in the

arbitration sequence as determined by the arbitration algorithm implemented, and by command from the reader (sending arbitration commands), it switches on its Transmitter, and begins to shift out the tag ID data, starting from bit position following the point where the comparison with the mask ended.

33 A transponder or tag as claimed in claim 32, wherein at the same time as the tag ID data is shifted out to the modulator, it is also shifted through the CRC generator, the CRC generator taking up where it previously stopped as if it had not been frozen and without resetting its value.

34 A transponder or tag as claimed in claim 23, wherein when the last data bit has been shifted out, a switch within the tag switches to the output of the CRC generator which continues transmitting until all the CRC bits have been transmitted.

35 A transponder or tag as claimed in claim 24, wherein when the last CRC bit has been transmitted a further switch in the tag switches off the transmitter and returns the tag to the standby state.

36 A transponder or tag as claimed in any of claims 27 to 29, wherein means are provided whereby when the tag is receiving the mask and performing the comparison with the internal memory data, it is also shifting the internal data through the checksum or CRC generator, this being a second CRC generator similar to that used to generate the tag CRC.

37 A method of calculating and verifying the integrity of data in a data communication system comprising a base station and one or more remote stations, the method including;

transmitting a select instruction from the base station to said one or more remote stations, the select instruction containing a data field which matches a portion of an identity or other data field in one or more of the remote stations;

communicating from a selected remote station or stations a truncated reply containing identity data or other data of the remote station but omitting the portion transmitted by the base station;

calculating in the base station a check sum or CRC from the data the truncated reply data received

and comparing the calculated check sum or CRC with the check sum or CRC sent by the remote station.

38 A method as claimed in claim 37, wherein the CRC is based on the transmitted [truncated] portion of the tag message, the reader calculating and using only that portion of the data sent by the tag ignoring the unsent part.

39 A method as claimed in any one of claims 1 to 15, claims 37 or 38, wherein the calculation in the base station of a check sum or CRC may be based from the same section or sections of the full data message used by the remote station to calculate the CRC sent with the data transmitted, this being the data field originally sent, and the truncated reply data received and comparing the calculated check sum or CRC with the check sum or CRC sent by the remote station.

40. A method of calculating and verifying the integrity of data in a data communication system comprising one or more base stations and one or more remote stations, the method including;

transmitting a select instruction from the remote station to said one or more remote base stations, the select instruction containing a data field which matches a portion of an identity or other data field in one or more of the remote base stations;

transmitting from a selected bases station or stations a truncated reply containing identity data or other data of the base station but omitting the portion transmitted by the remote station;

calculating in the remote station a check sum or CRC from the data the truncated reply data received.

and comparing the calculated check sum or CRC with the check sum or CRC sent by the remote station.

41. A reader or interrogator for use in a system with one or more remote stations, the reader including;

a transmitter arranged to transmit one or more select instructions to said one or more remote stations, the select instruction or instructions containing a data field which matches a portion of an identity or other data field in one or more of the remote stations;

a receiver arranged to receive a truncated reply containing identity data or other data of the remote station but omitting the portion transmitted by the reader or interrogator;

calculating means for calculating a check sum or CRC from the field originally sent and the truncated reply data received, or calculated from the check sum or CRC from the truncated data alone;

and a comparator for comparing the calculated check sum or CRC with the check sum or CRC sent by the remote station.